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AN ANALYSIS OF THE ODYNERUS CONGRESSUS GROUP OF THE SUBGENUS LEPTOCHILUS

(Hymenoptera, Vespidae)

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Most indications point to the origin of the subgenus *Leptochilus*¹ somewhere along the *Stenodynerus* line. If such is the case, the *congressus* group probably represents the first offshoot. This is indicated by the many characters possessed in common by the group represented by *Stenodynerus anormiformis* Vier. and the *congressus* group, which become lost or altered in the more specialized types of *Leptochilus*. These are the rounded or flattened postscutellum, the median suture of the second sternite, the shape of the second cubital cell, the five-toothed female mandibles, and the lengthened third antennal segment. In fact the chief character separating the two subgenera when these two related groups are involved is the presence in *Stenodynerus* of distinct pronotal pits.

The ocular tubercles which occur in most of the species of this group also are found in certain other *Leptochilus* as well as sparingly in other subgenera. They are typically smooth swellings tangent to the upper and inner angle of the compound eyes. Their greatest development occurs in *congressus* Vier., in which they often extend over a large portion of the face.

Specimens used in this study were borrowed from the U. S. National Museum, the Bureau of Biological Survey of the U. S. Department of Agriculture, the California Academy of Sciences, the University of Kansas, and Pomona College. I am also indebted for material to J. Bequaert, P. H. Timberlake, E. G. Linsley, C. D. Michener, M. A. Cazier, F. L. Blanc, J. H. Mitchell, L. D. Phillips, B. E. White, and N. W. Frazier.

Holotypes and allotypes have been deposited in the California Academy of Sciences.

¹ *Leptochilus* and *Stenodynerus* are here treated as subgenera of *Odynerus*. Some authors prefer to treat them as genera.

SYNOPSIS OF THE SPECIES OF THE ODYNERUS CONGRESSUS GROUP

Postscutellum not sharply crested; hind face of propodeum with a dorsolateral tubercle or short ridge; forewing with the two veinlets of the second cubital cell which border on the first and third discoidal cells forming almost a straight line; second sternite with a crease-like basal median suture; interocellar tubercles when present essentially parallel; female mandible five toothed.

1. Hind face of propodeum with a pointed tubercle on each side; front margin of pronotum with a conspicuously projecting membranous flange which is about an ocellus width; second tergite sharply reflexed apically; second sternite of male with a pair of small medio-lateral teeth.....2
- Hind face of propodeum with a short sharp dorso-lateral ridge; front margin of pronotum inconspicuous; second tergite hardly reflexed apically; male second sternite untoothed.....3
2. Vertex with bulging ocellar and ocular tubercles....*deformiceps*
- Vertex without ocellar or ocular tubercles.....*platycerus*
3. Vertex without interocellar tubercles; interocellar area not furrowed; head prolonged behind the eyes; scutellum but not postscutellum pale marked; male middle femur not conspicuously deformed*russipes*
- Vertex with prominent interocellar tubercles or at least with interocellar area furrowed; scutellum and postscutellum, or the latter only, pale marked; male middle femur usually distinctly deformed4
4. Postocular and interocellar tubercles covered with punctures except at their summits.....*infuscipennis*
- Tubercles very prominent, smooth and shining.....5
5. First tergite (at least) marked with light reddish.....6
- First tergite marked with dark red or without red; last antennal segment of male robust and flattened; male middle femur much broader basally than trochanter.....7
6. Last antennal segment of male slender and nearly cylindrical but not apically excavated; male middle femur enlarging abruptly from the base (Texas, New Mexico, and Colorado).....*martini*
- Last antennal segment of male thick, flattened, and apically excavated; male middle femur enlarging abruptly from the base (California and Arizona).....*russatus*
7. Black with whitish markings; head swellings often enormous and extending down the face toward the ocular emarginations.....*congressus*
- Black with yellow markings; head swellings moderate.....*tetralobus*

Odynerus infuscipennis Bohart, new species

Male. Black with the following whitish yellow: Clypeus, lower eye margins, first antennal segment in front, Y-shaped interantennal spot, postocular spot, front margin of pronotum, tegula mostly, spot beneath, two spots on scutellum, stripe across post-scutellum, lateral spot on propodeum, legs partly, apices of first five tergites and second sternite, attached lateral spot on first tergite, large free lateral spot on second tergite, mandible mostly, antennal apex, legs partly, dark reddish; wing veins dark, membrane almost evenly smoky. Pubescence pale, short, and sparse. Puncturation moderately coarse, becoming coarse on second sternite, clypeus well punctured. Head about as broad as long, clypeus narrowly and roundly incised apically; third antennal segment over twice as long as broad; interocellar area furrowed but only slightly tuberculate; ocular tubercles low and punctured except at their summits. Humeral angles slightly more than 90 degrees; middle femur nearly normal. Aedeagus constricted somewhat sub-basally; paramere hairless except at inner base. Length to apex of second tergite, 6.5 mm.

Female. Clypeus black except for apical spot, complete stripe across scutellum, legs largely red and black, fifth tergite dark, venter black except for lateral spots on second sternite. Clypeus narrowly incised, apical teeth sharp; third antennal segment about twice as long as second; second abdominal segment broader than long; length of apex of second tergite, 7 mm.

Holotype male and one paratype male, Bass Lake, Madera County, California, June 6, 1938 (R. M. Bohart); allotype female and one paratype female, Mariposa, Mariposa County, California, June 13, 1938 (J. R. Warren and R. M. Bohart). One female paratype, Yakima, Washington, July 4, 1882. One male paratype, Ten Cent Lake, Steens Mts., Oregon, July 29, 1937 (Bolinger and Jewett). Ten other paratypes from the following localities (all California): Cayton, Shasta County; Meadow Valley, Plumas County; Tuolumne County, 3,500 feet; Usona, Mariposa County; Davis, Yolo County; Antioch, Contra Costa County; Murphys, Calaveras County; Cascade, Fresno County. Paratypes in collections of U. S. National Museum, J. Bequaert, and the author.

In this species the pale markings are variable. The type material is restricted to those specimens which are marked with whitish yellow, but additional specimens are at hand in which the markings are distinctly yellow as well as being more extensive. These are mainly from southern California (Monterey and Los Angeles Counties) but a few are from Davis Creek and Las-

sen Creek, Modoc County. Because of the variation even within the white-marked specimens, it does not seem worthwhile to designate these yellow forms by a separate name. Occasional white-marked females are also red-noded.

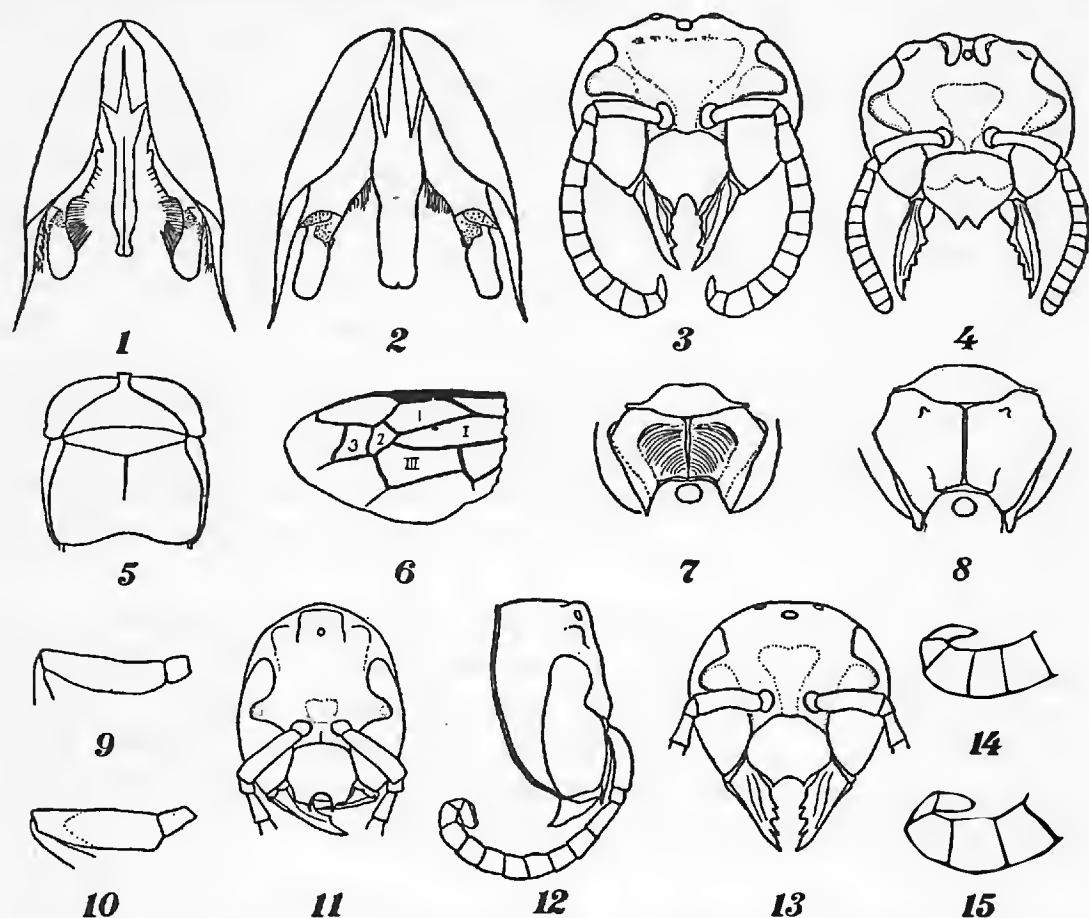


Fig. 1, *deformiceps*, dorsal view of male genitalia; fig. 2, *russatus*, dorsal view of male genitalia; fig. 3, *russatus* male, front view of head; fig. 4, *congressus* female, front view of head; fig. 5, *congressus* male, ventral view of first two abdominal segments; fig. 6, *congressus*, apical wing venation; fig. 7, *congressus*, posterior view of propodeum; fig. 8, *deformiceps*, posterior view of propodeum; fig. 9, *russatus* male, lateral view of middle femur; fig. 10, *congressus* male, lateral view of middle femur; fig. 11, *deformiceps* male, front view of head; fig. 12, *deformiceps* male, lateral view of head; fig. 13, *russipes* male, front view of head; fig. 14, *russatus* male, terminal antennal segments; fig. 15, *russipes* male, terminal antennal segments.

Odynerus tetralobus Bohart, new species

Male. Black marked with yellow as follows: Clypeus, first antennal segment in front, margin of pronotum broadly, tegula and spot beneath, stripes across scutellum and post-scutellum, lateral spot on propodeum, legs partly, apical bands on first five tergites and second sternite, attached lateral spots on first two tergites. Tarsi, tibiae partly, wing veins, brownish; apical cell of forewing and costal margin clouded, membrane otherwise mainly clear.

Pubescent short, pale, and obscure. Puncturation moderate, punctures mostly separated by at least one puncture diameter, clypeus well punctured. Head broader than long; clypeus roundly incised apically, emargination less than distance between apical teeth; third antennal segment about twice as long as second, last segment flattened and twice as long as broad; interocellar and ocular swellings prominent and shiny. Humeral angles approximately 90 degrees; middle femur strongly flattened and much broader basally than trochanter. Length to apex of second tergite, 7.5 mm.

Female. Clypeus dark-margined laterally, head markings reduced in size; scutellum two spotted. Clypeus sharply toothed and roundly incised apically; length to apex of second tergite, 8 mm.

Holotype male, Coalinga, Fresno County, California, May 14, 1938 (M. A. Cazier); allotype female and two paratype females, Riverside, Riverside County, California, May, on *Eriogonum fasciculatum* (P. H. Timberlake); male paratype, Gavilan, Riverside County, California, May 31, 1937 (P. H. Timberlake); female paratype, Mint Canyon, Los Angeles County, California, May 25, 1937 (E. P. Van Duzee). Paratypes in collections of P. H. Timberlake and the author.

Although resembling *congressus* closely in markings, *tetralobus* is a larger species with much more prominent head swellings. Also, the male last antennal segment in the former is slender and nearly cylindrical, whereas that of *tetralobus* is stout and flattened. The male middle femora are similar, but more flattened and swollen in *tetralobus*.

Odynerus martini Bohart, new species

Male. Black marked with whitish as follows: Clypeus, mandible partly, Y-shaped interantennal spot, first antennal segment in front, lower orbital stripe, postocular spot, front margin of pronotum, tegula and spot beneath, stripes across scutellum and postscutellum, lateral spot on propodeum, legs partly, apical margins of first four tergites and second sternite, free lateral spot on second tergite. Mandible mostly, antenna beneath and apically and second sternite partly, reddish; wing veins brown, membrane unclouded except slightly in apical cell. Pubescence short, pale, and obscure. Puncturation moderate, punctures mostly separated by about a puncture diameter; clypeus well punctured. Head broader than long; clypeus narrowly and angularly incised apically; interocellar and ocular swellings prominent and shining; third antennal segment about twice as long as second; last segment slender, curved, and nearly three times as long as broad. Humeral angles obtuse; middle femur strongly flattened and concave on outer side. Length to apex of second tergite, 6 mm.

Female. Clypeus black except for a subapical spot, whitish markings of head reduced, legs black and red, propodeum largely red, first three tergites and second sternite apically banded, free spot of second tergite faint and reddish. Clypeus angularly incised at apex; length to apex of second tergite, 7.5 mm.

Holotype male, Davis Mts., Texas, May 13, 1937 (J. O. Martin); allotype female, Finlay, Texas, July 2, 1930 (J. O. Martin). Paratype male, Sierra Blanca, El Paso County, Texas, July 8, 1917. Two female specimens which are probably this species are from Greeley, Colorado, June 6, 1902, and Las Cruces, New Mexico, respectively.

This species resembles *russatus* closely in general structure and markings. These are the only two species of the group, with the exception of *russipes*, having extensive light reddish markings. Although the females are practically indistinguishable, the males differ both in antennae and middle femora as indicated in the key. In addition the clypeus of *russatus* male is roundly instead of angularly excavated. This difference is much less obvious in the females. The head swellings in these two species are prominent but never reach the extreme knob-like condition found in most *congressus*. The supposedly *martini* female from Las Cruces has the body mostly reddish and undoubtedly the extent of red coloration is highly variable. As mentioned elsewhere, occasional specimens of *congressus* and *infuscipennis* have dark reddish showing up in the nodal area, and *russipes* is normally red-noded in the female only.

Odynerus russatus Bohart, new species

Male. Red marked with whitish as follows: Clypeus, face mostly, postocular spot, pronotum in front, tegula and spot beneath, stripes across scutellum and postscutellum, lateral spot on propodeum, legs partly, apical bands on first, second, fourth and fifth tergites and second sternite, a lateral attached spot on first tergite, a free lateral spot on second tergite. Scutum, wing veins, apices of terminal tergites, dark reddish brown; wing membrane mostly clear, apical cell clouded. Pubescence short, pale, and obscure. Puncturation moderately coarse, punctures mostly separated by at least a puncture diameter, clypeus sparsely punctured. Head slightly broader than long; clypeus roundly and deeply incised apically; third antennal segment about twice as long as second; last segment flattened, hardly twice as long as broad, and with the tip excavated (see figure). Aedeagus very broad and stout, hardly constricted sub-basally (see figure); paramere hairless except at inner base. Length to apex of second tergite, 7 mm.

Female. Clypeus irregularly marked with red, facial marks reduced in size, no interocellar marks, legs almost entirely red. Clypeus with a somewhat angular, narrowly rounded apical incision; length to apex of second tergite, 8 mm.

Holotype male, allotype female, and one male paratype, San Felipe Creek, Imperial County, California, July 8, 1933 (H. S. Gentry). Other paratypes, one male, Buckeye, Arizona, March 18, 1934, on *Lycium torreyi* (P. H. Timberlake); one male, Tucson, Arizona, July 25, 1940, on *Lycium parviflorum* (J. Bequaert); one male and two females, Indio, Riverside County, California, April 9, 1936, at flowers of *Prosopis* (P. H. Timberlake); one female, Indio, California, March 25, 1937 (G. E. and R. M. Bohart). Paratypes in collections of P. H. Timberlake, J. Bequaert, and the author.

Considerable variation exists in the extent of the red coloration which may be supplanted with black except in the nodal area. Apparently there is a seasonal variation with the redder forms emerging in midsummer. The peculiar male antennae separate the species at once from all others. The female may be confused with *martini* which is, however, a more easterly species.

ODYNERUS CONGRESSUS Viereck

Odynerus congressus Viereck, 1908, Trans. Amer. Ent. Soc., 33:405. (Holotype female, Univ. Kansas.)

Black marked with whitish which is distributed about as in *russatus* except that propodeum and scutellum are usually unmarked and second tergite lacks free spots; nodal area rarely marked with dark reddish. Similar in structure to *russatus* except that head swellings are usually greatly enlarged and extending down the face. Also, last antennal segment of male stout and flat but not excavated apically, and male middle femur concave on outer side and strongly flattened.

Records. Arizona: Bill Williams Fork, Phoenix, Higley, Congress Junction (type locality), Palmerlee, and Tucson (June to August). Texas: Sierra Blanca, El Paso County, July 8. New Mexico: Florida, July 6, on *Actinella* (T. D. A. Cockerell). California: Morongo Valley, San Bernardino County (September); Coachella Valley, Riverside County (May to August); Imperial County (April to November). P. H. Timberlake records it visiting the flowers of *Acacia greggii*, *Prosopis juliflora*, and *Croton californicus* in the Coachella Valley of California.

Odynerus russipes Bohart, new species

Male. Black; labrum, clypeus, mandible mostly; first antennal segment in front, triangular interantennal spot, ocular spot, front margin of pronotum, tegula mostly, spot below, stripe across scutellum, legs partly, apical bands on abdominal tergites one to five and sternites two to four, lateral spots on tergites one and two, whitish; tip of mandible, antennal flagellum, wing veins, tibiae and tarsi partly, last three abdominal segments mostly, reddish brown. Pubescence pale, obscure, and sparse; clypeus hardly silvered. Puncturation moderately thick, punctures mostly separated by one puncture diameter or slightly less. Head enlarged behind eyes but without smooth swellings; mandible five toothed, second tooth most protruding; clypeus deeply and roundly incised apically; third antennal segment less than twice as long as second; last two segments nearly equal in length, the last about twice as long as broad. Humeral angles obtuse; middle femur normal. First abdominal segment broadening abruptly subapically as viewed from above; aedeagus slender and with a long narrowed subapical neck; paramere densely hairy, especially on inner side. Length to apex of second tergite, 6.5 mm.

Female. Clypeus black; interantennal spot long oval; apex of postscutellum, propodeum, and base of first antennal segment, red; first three tergites and sternites two and three apically white banded. Head longer than broad as viewed from the front, clypeus roundly incised; second abdominal segment longer than broad; length to apex of second tergite, 8 mm.

Holotype male, Westgard Pass plateau, Inyo County, California, May 3, 1937; allotype female, same locality, May 27, 1937. Paratype male, Globe, Arizona, July 4, (D. K. Duncan); two male paratypes, Charleston Mt. Park, Nevada, May 24. Other paratypes (all from Inyo County, California): two males and one female, Inyo Mts.; six males and one female, Mazurka Canyon; one male, Panamint Mountains; one male, Westgard Pass plateau; one male, Little Lake. Paratypes in collections of U. S. National Museum, J. Bequaert, and the author.

The species can be readily distinguished by its unfurrowed and unswollen interocellar area, the whitish scutellum but dark postscutellum, and the lengthened head. In the last-named character it approaches *platycerus* and *deformiceps*, to both of which it is probably related. It is apparently a connecting link between these odd species and the more typical members of the group. The sexual dimorphism of *russipes* is striking, the female being red-noded.

Odynerus platycerus Bohart, new species

Male. Black; clypeus, first antennal segment in front, inter-antennal spot, orbital spot, postocular spot, front margin of pronotum narrowly, tegula mostly, stripe across scutellum, legs partly, apical bands on first six tergites and sternites two to four, yellow; spots on second to eleventh antennal segments, last two segments entirely, legs partly, reddish brown; terminal segment of tarsi dark, others light; wings deeply brown-stained. Pubescence short, thick, and pale to golden. Puncturation close and moderately coarse, punctures mostly nearly contiguous, clypeus well punctured. Head longer than broad, cubical; clypeus broad and semi-circularly emarginate apically; third antennal segment about twice as long as second; last two segments lengthened, last segment large, flat and spoon-shaped; mandible three toothed, basal tooth very large. Front margin of pronotum with a projecting membranous edge, lateral angles slightly obtuse; hind face of propodeum with a sharp lateral tooth instead of a ridge; middle femur of irregular shape, swollen basally and depressed externo-medially. First tergite slightly flared apically in dorsal view; second tergite longer than broad and apically reflexed collar-like; second sternite with a sharp latero-medial tubercle; genitalia about as figured for *deformiceps* but aedeagus slightly stouter. Length to apex of second tergite, 10 mm.

Holotype male, Guadalajara, Mexico, July, 1909 (D. L. Crawford).

This peculiar species resembles *deformiceps* but lacks the head swellings.

Odynerus deformiceps Bohart, new species

Male. Black; clypeus, first antennal segment in front, inter-antennal spot, orbital spot, postocular spot, front margin of pronotum, tegula mostly and spot beneath, stripes across scutellum and postscutellum, lateral spot on propodeum, legs partly, apical bands on first six tergites and second to fourth sternites, lateral attached spot on first tergite, pale yellow; spots on second to eleventh antennal segments, last two segments entirely, legs partly (last segment of tarsi dark), tegula partly, reddish brown; wings stained with brownish. Pubescence short, fairly sparse, and pale to fulvous. Puncturation moderately coarse, especially on abdomen where punctures are nearly contiguous; vertex weakly punctured; clypeus finely punctured. Head longer than broad and greatly swollen in ocellar area; third antennal segment about twice as long as second; last segment very large, flat and spoon-shaped (see figure); mandible three toothed, basal tooth very large, clypeus broad and semi-circularly emarginate apically; ocular and interocellar tubercles extremely prominent; ocelli reduced; post-

ocellar area long and nearly flat in lateral view. Front margin of pronotum with a projecting membranous edge, lateral angles slightly obtuse; hind face of propodeum with a sharp lateral tooth instead of a ridge; middle femur of irregular shape, swollen basally and depressed externo-medially. First tergite flared apically in dorsal view; second tergite longer than broad and apically reflexed collar-like; second sternite with a sharp latero-medial tubercle; genitalia as figured. Length to apex of second tergite, 11 mm.

Female. Clypeus about as long as broad and black except for a basal crescent, head swellings less prominent than in male, second sternite without tubercles.

Holotype male, Cochise County, Arizona, August 14, 1916 (Virgil Owen); allotype female, Palmerlee, Arizona, October. Paratypes (all from Arizona): three males, Ramsey Canyon, Huachuca Mts. (W. H. Mann); one male, Palmerlee, Arizona. Paratypes in collections of U. S. National Museum, J. Bequaert, and the author.

This extraordinary insect was placed in this group only after considerable deliberation and the discovery of the related species, *platycerus*, which links it to *russipes*. It is remarkable for its oddly shaped head and long slender body as well as for the numerous distinctive secondary sexual characters of the male.

HABITS OF *TIPHIA SHASTENSIS*

On May 29, 1941, near Old Station, Shasta County, California, a large number of fresh emergence holes of the scarab beetle, *Phyllophaga errans* Lec., were noted along the edge of a little used dirt road. A closer examination revealed many females of *Tiphia shastensis* Krombein digging into and emerging from the ground as well as a few males following them about and attempting copulation. The female wasps flew rarely but wandered over the ground exploring the surface with their antennae. After a relatively short search they began to burrow into the ground vertically and within a few moments they would be out of sight. A small amount of excavation revealed several additional wasps and a larva of *P. errans*, suggesting the possibility that the tiphids are parasites of the latter.—E. G. LINSLEY and C. D. MICHENER.

REVISION OF THE TERMITAPHIDIDAE (Hemiptera)

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Knowledge of the termitophilous genus *Termitaradus* has been at a standstill since the last of Myers' excellent papers (1932). Myers (1924) first recognized the genus as distinct from the monotypic *Termitaphis* of Colombia and gave a "key to the females of the seven adequately described species." In 1932 he was able to give a redescription of the eighth species, *australensis* (Mjöberg), describe a new species from Jamaica, and describe the eggs of *guianae* (Morrison). Unfortunately a revised key was not given at that time, probably because of the uncertain status of the two Trinidad species, *trinidensis* and *insularis* described by Morrison in 1924.

The two Trinidad species (both based upon single specimens collected at the same time and place in galleries of the same species of termite) have long been a source of confusion and have occupied isolated positions in Myers' classification; *trinidensis* because of its small number of abdominal flabella (4 instead of the usual 6 or 8) and *insularis* because of its small number of body lobes (12 instead of 13 or 14 as in all other *Termitaradus* females). However, Myers' work (1924) strongly suggested that the number of body lobes varied between 13 and 14 (both forms were present in his series of *panamensis*) and he even had an incipiently 12-lobed female of *jamaicensis* in 1932. Furthermore, he showed that there were only four marginal flabella to each abdominal lobe in the penultimate nymphal instar of *jamaicensis*.

Through the kindness of Dr. A. M. Adamson of the Imperial College of Tropical Agriculture in Trinidad, I recently received a collection of sixty-nine specimens of *Termitaradus* from Trinidad and Tobago, B. W. I. Specimens were collected by Dr. Adamson at the following localities: Manzanilla, Trinidad, May 24, 1936 (34 specimens); Caura Valley, Trinidad, January 1, 1936 (12 specimens); Mayaro, Trinidad, May 10, 1936 (6 specimens); Caledonia District, Tobago, December 27, 1938 (3 adults and many eggs); and Bacolet, Tobago, September 13, 1938 (14 specimens). This fine collection includes eggs, nymphs of vari-

ous instars, and adult males and females. Dr. Adamson tells me that of the 150 or more species of termites in Trinidad he finds *Termitaradus* only in the galleries of the one species, *Heterotermes tenuis* (Hagen), where they are apparently quite common.

A study of this fine series of specimens sheds considerable light on the limits of variation in *Termitaradus* and settles the status of the doubtful Trinidad species. It now seems obvious that the basic number of lobes on either side of the body is 14 but that 13- and even 12-lobed females occur within the same species. The number of marginal lobules and flabella is very variable on the thoracic lobes but is more constant on the middle lobes of the abdomen and is very constant on the head lobes and on the lobes of the eighth abdominal segment. This last character is so constant and the three-lobule condition occurs so consistently throughout all of the American species in contrast to the two lobules and flabella of the Old World species that one is tempted to reject the record of *mexicana* (2-lobules) as an error in observation. Certainly this is an inconsistency that should be checked when the type or other material is examined.

It seems certain that *trinidadiansis* (Morrison, 1923) is the nymph (2 mm. long and 4 marginal flabella on either side of most of the abdominal segments) and *insularis* (Morrison, 1923) is the 12-lobed adult female of a single species. I have nymphs with 4 marginal flabella which are about 1.75 mm. long and, as mentioned above, 12-lobed females are also present in my series. The differences in shape of flabella illustrated by Morrison (1923) fall within the extremes of variation seen in a single individual, though the typical form lies between these two. The name *trinidadiansis* is retained with *insularis* as a synonym because it has page precedence, is more appropriate, and corresponds to other geographical specific names in the genus.

The specimens from Trinidad and Tobago have been carefully compared and appear to be identical although the Tobago specimens average slightly smaller. The flabella of the second cephalic lobes are much smaller than those of the other body lobes in *trinidadiansis* and one Tobago specimen has these flabella so short that they project beyond the margins of the lobules only at their rounded apices.

Male Termitaphidids are typically 12-lobed, the meso and metathoracic lobes being fused. As pointed out by Myers (1924), they seem to average one more lobule and flabella to each of the

anterior abdominal lobes than in the female of the same species. Males have not been incorporated into the classification because they are known only for *annandalei*, *guianae*, *panamensis*, and *trinidadiansis*, they lack the very useful differentiating character of 2 or 3 lobules and flabella on the eighth abdominal lobes, and they differ from the females in average number of flabella on the other abdominal lobes. On the other hand, the flabella are similar in form in both sexes so it is a simple matter to associate the two sexes of a single species. The male genital capsule is very conspicuous, quite fully exposed, and may eventually provide characters for specific differentiation. The basal plates of the aedeagus are completely fused, thus differing from the Aradidae as described by Singh-Pruthi (1925), and the conjunctiva is sclerotized on either side into a plate with a recurved hook. The parameres are long, slender, tapering, and sinuous, being gradually curved near the middle and slightly recurved near the apex.

The eggs are similar to those described by Myers (1932) for *guianae*, being .87 mm. long and .55 mm. across greatest width. This is in spite of the considerably larger size of *trinidadiansis* adults. The chorion is very thin, completely transparent, and finely pitted under magnification of 108 diameters. Beneath the chorion is the usual embryonic envelope which is discernible only upon dissection. As noted by Myers, no cap or micropylar processes are developed.

The food habits of the Termitaphididae are still a matter for conjecture but China (1931) called attention to the parallelism in structure of mouthparts (coiled setae) in the Plataspidae, Aradidae, and Termitaphididae and showed that this is a specialization for feeding on the mycelia of fungi. In 1936 I recorded a termitophilous Aradid, *Mezira reducta* Van Duzee, found commonly in the galleries of *Zootermopsis nevadensis* (Hagen). Since Hendee (1933) has shown that fungi are normally found in abundance in the galleries of termites and are rare or absent in sound wood, it seems obvious that the *Mezira* mentioned above and the Termitaphididae in general feed upon fungi associated with termite galleries.

A revised key to the Termitaphididae has been prepared based upon Silvestri's original key (1911) and the subsequent revisions of Morrison (1923) and Myers (1924). One female of *Termitaradus panamensis* Myers and two females of *guianae* (Morrison) were available for study and comparison thanks to

Mr. H. G. Barber, who also examined the types of *trinidadiansis* and *insularis* in the collection of the United States National Museum and confirmed the critical characters at my request. I might add that the entire problem of the taxonomy of the present material was first referred to Dr. Morrison who turned the matter over to Mr. Barber. Thanks are due to the authorities of the United States National Museum and to both of these men for their cooperation.

SYNOPTIC KEY TO THE TERMITAPHIDIDAE

ADULT FEMALES

- A. Body egg-shaped, surrounded by a strongly incurved and up-curved, dorso-lateral, segmentally divided lamina, the edges of which are further divided into distinct, often quite distantly separated lobules, each with a long, fine almost smooth flagellum. Colombia. (*Amitermes foreli* Wasmann; fam. Termitidae) *Termitaphis circumvallata* Wasmann (1902)
- B. Entire body strongly flattened above and below and surrounded by a flat, lateral, segmentally divided lamina the margin of which is crenulate, forming short, non-separated lobules, each provided with a short, circular, clavate, or lanceolate flabellum with serrate edges. Tropicopolitan. (In association with termites of the family Rhinotermitidae.) *Termitaradus* Myers (1924) (Type: *Termitaradus panamensis* Myers, 1924).
 - 1. Flabella short and rounded, at most scarcely more than twice as long as broad.....2
 - . Flabella elongate, much more than twice as long as broad.....5
 - 2. Eighth abdominal lobes each with two lobules. Anterior abdominal segments normally with seven or more lobules on each side.....3
 - . Eighth abdominal lobes each with three lobules. Anterior abdominal segments normally with six lobules on each side.....4
 - 3. Flabella rounded. Anterior abdominal segments with not more than seven lobules on each side. Mexico. (*Heterotermes tenuis* Hagen).....*mexicana* (Silvestri, 1911)
 - . Flabella short, clavate. Anterior abdominal segments with eight or more lobules on each side. India. (*Coptotermes heimi* Wasmann).....*annandalei* (Silvestri, 1921)
 - 4. Flabella of second cephalic lobe half the size of other head and body flabella, but projecting conspicuously, ovate in form. British Guiana and Colombia. (*Heterotermes crinitus* Emerson and *tenuis* Hagen).....*guianae* (Morrison, 1923)
 - . Flabella of second cephalic lobe much smaller, minute, scarcely surpassing margins, perfectly circular in form. Jamaica. (*Heterotermes convexinotatus* Snyder)..*jamaicensis* Myers, 1932

5. Eighth abdominal lobes each with two lobules.....6
- Eighth abdominal lobes each with three lobules.....7
6. Flabella subcylindrical, rounded at apices or at most very obtusely pointed, echinate. Anterior abdominal lobes each with seven lobules. Africa. (*Rhinotermes putorius* Sjöst.).....
.....subafra (Silvestri, 1911)
- Flabella long, narrow, clavate, with straight sides and squarely truncate tips, not echinate. Anterior abdominal lobes each with eight or more lobules. Australia. (*Copotermes acinaciformis* Froggatt).....australiensis (Mjöberg, 1914)
7. Flabella lanceolate, very acute at apices. Panama. (*Heterotermes tenuis* Hagen and *convexinotatus* Snyder).....
.....panamensis Myers, 1924
- Flabella moderately clavate, rounded at apices. Trinidad and Tobago. (*Heterotermes tenuis* Hagen).....
.....trinidadensis (Morrison, 1923)
.....(= *insularis* Morrison, 1923)

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A NEW MIRID FROM OREGON (Hemiptera)

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Lopidea oregona Hsiao, new species (fig. 1)

Coloration suggestive of *L. picta* Kngt., but distinguished from it and its allied species by the simple male right genital clasper and the long third antennal segment which in the male is nearly as long as the second segment.

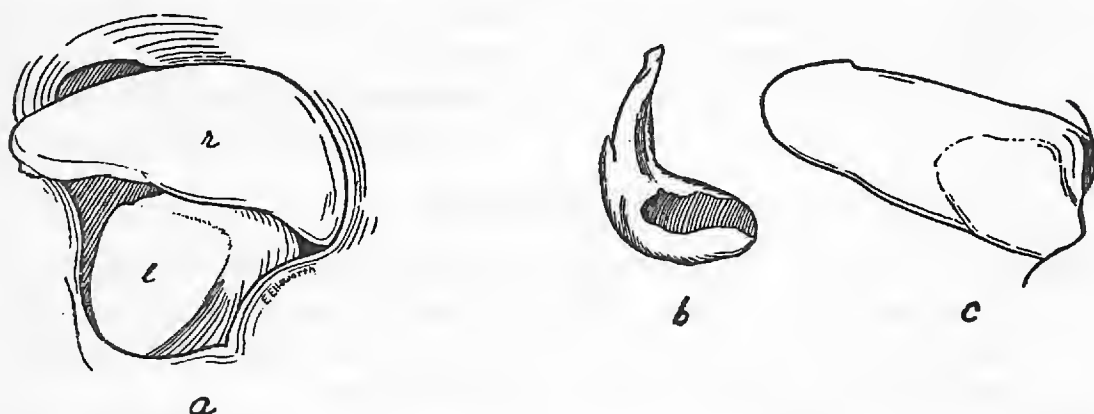


Figure 1. *Lopidea oregona* Hsiao, male genital claspers: a, both claspers, caudal aspect; b, left clasper, lateral aspect; c, right clasper, lateral aspect.

Male. Length, 4.9 mm., width, 1.505 mm., clothed with fine pale pubescence; dorsum fuscous; lateral margins of vertex, middle of frons anteriorly, genae, juga, lora (except apex), a longitudinal median line and anterior margin of pronotum, a broader longitudinal median line of scutellum, and embolar margins posteriorly, pale and slightly tinged with pinkish; base of vertex, frons, clypeus, and calli of pronotum, blackish; ventral side unevenly fuscous; gula, xyphus, propleura, first rostral segment dorsally, and anterior coxae, pale. Antennae black. Legs fuscous and tinged with reddish at the paler areas.

Head, width, 1.208 mm., length, .385 mm.; vertex, width, .638 mm., distinctly depressed before posterior carina. Rostrum: length, 1.225 mm., reaching upon intermediate coxae. Antennae: segment I, length, .438 mm.; II, 1.59 mm.; III, 1.575 mm.; IV, .385 mm. Pronotum: length, .823 mm., width at base, 1.4 mm., convex posteriorly, posterior and lateral margins moderately sinuate, humeral angles broadly rounded, calli prominent. Scutellum: length, .525 mm., width at base, .70 mm., moderately convex, finely trans-

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versely rugulose at middle. Hemelytra surpassing abdomen with apex of cuneus; corium: length, 2.27 mm.; cuneus: length, .70 mm., width, .35 mm.; membrane concolorous, finely rugulose. Tibial spinules fine and dark. Dextral genital clasper simple, leaf-like, length, .525 mm., width at base, .265 mm., with a rough-surfaced knob-like elevation at inner surface near apex.

Female. Very similar to the male in coloration, length, 4.725 mm., width, 1.4 mm.; length of antennal segments: I : II : III : IV = .42 mm. : 1.365 mm. : 1.138 mm. : .35 mm.

Holotype, male, SENECA, OREGON, July 11, 1935 (Joe Schuh), in collection of the California Academy of Sciences. Allotype, female, taken with the type, in collection of the California Academy of Sciences. Paratypes, two males and one female, taken with the type; three males and one female, REDMOND, OREGON, June 25, 1939 (K. W. Gray and J. Schuh); in collection of the Entomology Department of Oregon State College and collections of J. Schuh, H. H. Knight, and the author.

ON THE DATE OF PUBLICATION OF LAPORTE'S ESSAI

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The genera and species described by F. L. de Laporte, Comte de Castelnau, in his "Essai d'une Classification Systématique de l'Ordre des Hémiptères" have been dated by most taxonomists and bibliographers from 1832. In an effort to solve some questions of synonymy and priority I have recently had occasion to investigate the date of publication of the Essai, and have concluded that it did not appear until 1833, although the preceding parts of volume II of Guérin's *Magasin de Zoologie*, in which Laporte's Essai appeared, actually were printed in 1832.

The title page of the "deuxieme année" of the *Magasin de Zoologie* bears the date, 1832. The introductory paragraphs, however, are signed "Guérin, Paris, Mars 1833" and the opening sentences are—"Aujourd'hui nous faisons enfin paraître les 11 et 12 livraisons du *Magasin de Zoologie*. Ces deux livraisons, qui ont été retardées des circonstances indépendantes de notre volonté, formant le complément de l'année 1832." This is followed by a "Table Methodique" of the species and genera

“decrits ou indiqués dans l’année 1832.” An examination of the Table discloses that none of the genera or species treated in the *Essai* is listed, although a species described on the page immediately preceding the *Essai* is given. Laporte introduces the Supplement of the *Essai* with the statement “Ce travail ayant paru successivement, feuille par feuille, . . . ”

Thus in the *Essai* itself and in the volume of the journal in which it is published there is sufficient cause for doubting the 1832 date. Also it is made clear that the *Essai* appeared in parts. In his references to the Heteroptera, Westwood (Introd. Mod. Classif. Insects, 11:451, 1840) cites Laporte’s *Essai* as dating from 1833 as he previously had given it in an address read before the Entomological Society of London on January 21, 1835.

An examination of the early volumes of the *Annales de la Société Entomologique de France* and the *Entomological Magazine*, both of which had their inception in 1832, sheds still more light on the matter. On page 111 of the *Annales*, volume I, 1832, in the report of the “Séance du 29 février, 1832,” is the statement, “M. De Laporte lit un essai d’une nouvelle classification des Hémiptères.” In volume II of the *Annales*, p. xxxiii, livraison II of Guérin’s *Magasin* is listed among the works having been published since January, 1833; and on p. xlii, livraison 12 and 13 are noted as having appeared after April 1, 1833. Still later in this second volume of the *Annales* there is a list of works published by members of the *Société Entomologique de France* during 1833, which list includes Laporte’s *Essai*.

In volume I of the *Entomological Magazine*, p. 305, there is a review of Guérin’s *Magasin de Zoologie* in which the reviewer specifically mentions Laporte’s *Essai*. This is in the third number of the volume, issued in April, 1833. In the fifth number of the same volume, issued in October, 1833, one finds Guérin’s *Magasin de Zoologie* again reviewed in the “Notice of Entomological Works” and it is specifically noticed that “De Laporte’s excellent Essay on the Hemiptera is concluded.”

In the copy of volume II of Guérin’s *Magasin* before me there is no indication of the livraisons. One surmises that Laporte’s *Essai* was issued as livraisons eleven and twelve and perhaps the Supplement as thirteen (note: Guérin’s introduction does not mention the thirteenth). In any case it seems clearly evident that no parts of the *Essai* were issued in 1832, and that a portion of it, but not all, appeared before April, 1833.

A NEW EMPIS OF THE SUBGENUS PACHYMERIA (Diptera, Empididae)

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In *Genera Insectorum*, fasc. 185, Melander lists four nearctic species of *Empis* referable to the subgenus *Pachymeria*.

The subgenus may be characterized as follows. Short, robust, blackish-gray species; eyes of female broadly, those of male narrowly separated (contiguous in male *johnsoni*) and with small uniform facets; face broad; humeral, propleural, and metapleural bristles not unusually strong; dorsocentrals and acrosticals biserial or multiserial; legs short, robust, the hind femora more or less thickened; legs in both sexes not ciliated with flattened scales; fourth vein reaching wing margin; anal angle of wing not obtuse, more or less rectangular; abdomen short, broad, its segments without strong dorsal bristles.

The known nearctic species may be separated by the following key:

KEY TO THE SPECIES OF PACHYMERIA

1. Hind femora no longer than middle ones; male dichoptic.....2
- Hind femora one-third to one-half longer than middle ones....3
2. Abdomen wholly shining black.....*brevis* Loew
- Abdomen with distinct white pollinose markings, especially toward apex.....*pudica* Loew
3. Abdomen with pile, except on first segment, largely or wholly pale and with distinct grayish pollinose areas on all segments.
.....*montiradicis* James, n. sp.
- Abdomen wholly black—pilose and shining or with greatly reduced pollinose markings.....4
4. Antennal style one-third as long as third segment; male dichoptic*otiosa* Coq.
- Antennal style one-half as long as third segment; male holoptic*johnsoni* Mel.

Empis (*Pachymeria*) *montiradicis* James, new species

Male. Head black, wholly dusted with grayish pollen except on oral margin, which is shining. Eyes in front of ocelli separated by approximately distance between paired ocelli; front broadening gradually above, suddenly below; face about three times width of narrowest part of front. Total length of antennae two-thirds height of head; length of first two segments combined a little less than width of face; ratio of three segments and arista 5:4:16:6; third segment lanceolate, two and a half times as long as its maximum width; antennae dull black, basal segments with

black pile. Bristles of vertex and occiput black; about twenty-five infraorbitals; numerous occipitals, not arranged in rows; pile long, yellow, sparse, more abundant below. Head as wide as high, slightly higher than long; proboscis almost twice height of head, yellow, base and sheath blackish, palpi and labella lemon-yellow; palpi with a few long black hairs in front. Thorax black, almost wholly covered with dense grayish pollen; mesonotum with four brown vittae, middle pair (between dorso-centrals and acrosticals) reaching approximately from suture almost to anterior margin, outer pair (outside dorso-centrals) greatly abbreviated in front but sometimes extending beyond suture; propleurals and meta-pleurals black, pleural sclerites of mesothorax bare; bristles and hairs of pronotum, mesonotum and scutellum black; four scutellars. Legs short; all femora thickened, one-fifth to one-fourth longer than their tibiae; front and middle femora of equal length, hind ones half again as long. Front femora brown to black, except at base and apex; middle and hind ones yellow to brown, paler above and behind; tibiae and tarsi yellow, hairs and bristles black. Wings hyaline; veins yellow; R_{2+3} slightly sinuate. Abdomen black, with grayish pollen; segment one with coarse black pile laterally; pile of other segments finer, usually yellow, often more or less black, longest on segment two; segment one with pilose areas shining; two to four shining except laterally and more or less at base, especially on the more posterior segments; five, six and all of venter pollinose. Venter without protuberances. Hypopygium short, appearing somewhat angular below; upper lamellae as long as hypopygium, twice as long as wide, elliptical, finely pubescent; aedeagus short, thick, flattened on basal half, when exerted, directed dorsally and forward to about apex of segment six, strongly contracted and recurved at tip; genitalia variably yellow to brown. Length, 6 mm.

Female. Similar except sexually. Front as wide as ocellar triangle; occipitals less abundant; pile and bristles of thorax and abdomen shorter; genitalia shining black.

Holotype, male, BOULDER, COLO., May 5, 1934 (James); author's collection. Allotopotype, female, BOULDER, COLO., May 25, 1933 (James). Paratopotypes, 27 males, 14 females, BOULDER, COLO., May 22, 1932 (James), May 28, 1933 (James), May 5 and 12, 1934 (James), May 25, 1938 (James), May 14, 1939 (Lanham). Paratypes: 2 males, 1 female, VALMONT, COLO., April 29, 1934 (M. and H. James); 10 males, 5 miles north of BOULDER, COLO., May 9, 1939 (Rodeck and Lanham); 2 males, 4 miles northwest of HYGIENE, COLO., May 15, 1937 (Lanham); 1 male, COLO. 2091, Foothills 6 miles west of Ft. COLLINS, May 4, 1896 (Gillette); 5 males, 2 females, COLO., 1853, HORSETOOTH GULCH, April 23, 1895 (Gillette).